

THE EFFECT OF WARM WATER SOAK HYDROTHERAPY AND PASSIVE ROM EXERCISES ON THE MUSCLE STRENGTH OF STROKE PATIENTS

Moh Hasbi Dzikri ZF¹, Yanti Cahyati¹, Syaukia Adini¹

¹Poltekkes Kemenkes Tasikmalaya

ABSTRACT

Background: Stroke is characterized by the death of brain tissue, which occurs due to reduced blood and oxygen flow to the brain due to blockage of blood vessels, which causes motor disorders and decreased muscle strength. So, efforts are needed to increase muscle strength with Warm Water Soak Hydrotherapy and Passive ROM Exercises. **Objective:** This study aims to determine the effect of warm water immersion hydrotherapy and ROM exercises on muscle strength in stroke patients. **Method:** This research used a pre-experiment, one-group pretest post-test design. Sampling used a purposive sampling technique with a sample size of 20 people. The statistical test used is the paired t-test with a significance of 0.05. **Results:** There was a difference in the average muscle strength values before and after being given warm water immersion hydrotherapy and passive ROM exercises with a *p-value* of 0.001. **Conclusions:** There is an effect of warm water immersion hydrotherapy and passive ROM exercises on muscle strength.

Keywords: Warm Water Soak Hydrotherapy, Muscle Strength, ROM Exercise, Stroke

Introduction

Stroke is a cerebrovascular disease characterized by the death of brain tissue, which occurs due to reduced blood and oxygen flow to the brain. This reduced blood and oxygen flow is usually caused by blockage, narrowing, or rupture of blood vessels (Sharif et al., 2020). Globally, 15 million people each year have a stroke, with one-third of them dying and the rest experiencing permanent disability. Based on data from the World Health Organization (WHO), stroke is the third leading cause of death and disability in the world, killing 2.7 million people, or 6.8 percent of the total population, in 2019; however, with 129,000 deaths every year and 1 out of every 20 deaths in the United States, stroke is the fifth leading cause of death in the country (Harahap, 2019). Around 500 thousand people every year experience strokes in Asia alone, especially in Indonesia. Of this number, around 2.5% died, and the rest experienced mild to severe disabilities. Although it is difficult to obtain accurate data, the incidence of stroke in poor and developing countries like Indonesia increases every year (Daulay & Hidayah, 2021). The number of cases in West Java who suffered a stroke, both based on diagnosis from health workers and symptoms, is estimated at 238,001 people (7.4%) and 533,895 people (16.6%) (Syah et al., 2020). In Tasikmalaya City, there is data on 18.77% of stroke patients routinely controlled, and in Tasikmalaya Regency, it is 20.56%. (Heart, 2022). Results of a preliminary study carried out in 2023 at Dr. Soekardjo Regional Hospital, which had 282 inpatient stroke patients.

Range of motion (ROM) training is a type of exercise that is considered quite effective in preventing disability in patients who have had a stroke (Kasma et al., 2022). ROM exercises are a collection of movements performed to increase muscle strength and flexibility. The goal of Range of

Motion (ROM) is to restore strength and flexibility to muscles and joints so that patients can carry out daily activities (Amirta, 2017). To gain independence, movement training is very important for stroke sufferers, because gradually, movement training will help leg and arm function return to normal. Muscle strength to control daily activities and the effects of not being given ROM rehabilitation can cause muscle joint stiffness. The patient's daily activities can depend entirely on the family, and the patient finds it difficult to meet daily needs. This exercise is adapted to the patient's condition and focuses on the ability to perform movements with control rather than on how big the movement is (Sejati & Sofiana, 2015). According to (Setiyawan et al., 2019), hydrotherapy is a treatment technique that uses water to treat and reduce various problems.

This warm water immersion hydrotherapy is inexpensive and has no dangerous side effects. According to the Indonesian Health Service (2014), warm water soothes, relieves muscle tension and pain, and improves blood circulation. So, soaking in warm water can help you sleep more easily and relieve stress. The warm water temperature used is 35 °C. Warm water can also be used as a therapeutic medium, such as soaking in warm water to increase muscle strength and smooth joints. This therapy has hydrostatic, hydrodynamic, and warm temperature effects, which improve blood flow. Warm water not only improves blood circulation but also calms the body (Anisa, 2022). This makes joint tissue more flexible, pain lighter, makes the body more relaxed, and increases the ability to move the body's limbs (Ulya, 2017).

Method

In this research, the sampling technique used was non-probability sampling. In non-probability sampling, each member of the population does not have an equal chance of being selected for the sample. The non-probability sampling method in this research is purposive sampling. Side purposive is a technique for determining samples based on the researcher's considerations regarding which samples are the most useful and representative and also conducting an ethical test at Jendral Achmad Yani University, Cimahi City.

Results

Table 1 Distribution of respondent characteristics based on age of stroke patients at Dr. Soekardjo Regional Hospital in 2024 (n=20)

Age	Frequency	Percentage
45-50 Years	4	20.0
51-55 Years	1	5.0
56-60 Years	6	30.0
61-65 Years	9	45.0
Jumlah	20	100.0

Based on Table 1, the results obtained from 20 respondents were mostly aged 61-65, with a percentage of 45.0%, and the number of respondents was nine people.

Table 2 Distribution of respondent characteristics based on the gender of Stroke patients at RSUD Dr. Soekardjo in 2024 (n=20)

Gender	Frequency	Percentage
Male	9	45.0
Female	11	55.0
Jumlah	20	100.0

Based on Table 2 above, it can be seen that the majority of respondents were 11 women, with a percentage of 55.0%.

Table 3 Distribution of respondent characteristics based on the length of illness suffered by Stroke patients at RSUD Dr. Soekardjo in 2024 (n=20)

Length of Suffering from Disease	Frequency	Percentage
<1 Year	13	65.0
>1 Year	7	35
Jumlah	20	100.0

Based on Table 3 above, it can be seen that the majority of respondents had suffered from illness for <1 year, with a percentage of 65.0%.

Table 4 Distribution of respondent characteristics based on comorbidities of Stroke patients at RSUD Dr. Soekardjo in 2024 (n=20)

Concomitant Diseases	Frequency	Percentage
Diabetes Mellitus	2	10.0
Heart	3	15.0
Hypertension	10	50.0
None	5	25.0
Jumlah	20	100.0

Based on Table 4 above, it can be seen that the majority of respondents had hypertension, with a percentage of 50.0%.

Table 5 Distribution of respondent characteristics based on the frequency of attacks by stroke patients at RSUD Dr. Soekardjo in 2024 (n=20)

Attack Frequency	Frequency	Percentage
One time	14	70.0
>1 time	6	30.0
Jumlah	20	100.0

Based on Table 5 above, it can be seen that the frequency of attacks by the majority of respondents was once, as many as 14 people, with a percentage of 70.0%.

Before the researchers carried out Bivariate Analysis, a normality test was carried out for the variable muscle strength values before and after the intervention using Shapiro Wilk; following are the results of the data normality test:

Table 6 Normality test of average muscle strength data for Stroke patients at Dr. Soekardjo Regional Hospital in 2024 (n=20)

Treatment	N	P. Value	Conclusion
Before	20	0.15	Normal
After	20	0.01	Abnormal

Based on Table 6, the researcher carried out a normality test using Shapiro-Wilk, and the results before the intervention were 0.15, so the data was normally distributed. After the intervention, it was 0.01, so the data was not normally distributed.

Table 7 Distribution of mean muscle strength values for Stroke patients at RSUD Dr. Soekardjo in 2024 (n=20)

Variable	Mean	SD	Min-Max	Difference	P. Value
Before	2.45	1.146	0-4	1.3	0.00
After	3.75	9.10	2-5		

Based on Table 7, the average muscle strength before the intervention was 2.45, and after the intervention, it was 3.75. The statistical test results obtained a p value of 0.00, so it can be concluded that there is a significant difference in the average muscle strength values before and after the intervention.

Discussion

The research results showed that the age of the respondents was dominated by the age range 61-65 years. This is in line with research conducted by Kabi, Tumewah, & Kembuan (2015); in stroke patients in Manado, the number of stroke sufferers was in middle age (30-50) and old age (61-65 years). Conceptually, the risk of having a stroke increases from the age of 45 years. At the age of 80 years, the risk of having a stroke is faster than at the age of 50 years. Two-thirds of strokes occur over the age of 61-65 years. The incidence of stroke increases with age; after reaching the age of 50 years and above, the risk of stroke increases by two times. According to Junaidi (2018), the older you get, the higher the risk. After age 55, the risk doubles within ten years. Two-thirds of all strokes occur in people over 65 years of age. However, that does not mean that strokes only occur in older adults because strokes can attack people of all ages.

Characteristics of research subjects in this study based on gender in women with a percentage of 55.0%; there are several factors that cause more stroke in women, including using birth control pills and pregnancy because the risk of stroke increases during normal pregnancy due to natural changes. In the body, such as increased blood pressure and changes in pumping in the heart. Hormone Therapy (HRT) is a combination hormone therapy of progestin and estrogen to relieve menopausal symptoms and have a thicker waist and high triglycerides (blood fat) post-menopause. This is supported by the opinion of Warlow et al. (2019), who say that the use of hormone replacement (HRT) after menopause will increase the risk of acute coronary syndrome, stroke, and venous thrombosis. By looking at previous researchers in relation to the results of the current study, the highest number of stroke patients who experience weak hemiparesis muscle strength are women.

Most respondents suffered a stroke < 1 year, in line with research by Hayulita and Desti (2017), which states that the majority of stroke patients have suffered from a stroke for < 1 year. Having suffered a stroke less than one year is included in the chronic phase of stroke (Fuath, 2015). Knowing how long someone has suffered from a stroke will be able to determine appropriate medical management, especially rehabilitation, that can be given to stroke patients. Furth (2015) states that physical rehabilitation training in the chronic phase consists of physical exercise, daily walking or on a treadmill, strength training, and balance training. Fatoye in Hayulita and Desti (2017) explains that the length of time one suffers from a stroke will affect a person's condition in accepting their physical condition. Suffering from a stroke for a long time will also make stroke patients more hopeless about what they are experiencing, which will make the patients feel depressed and helpless about what they are experiencing (Hayulita & Desti, 2017). Weinstein et al. (2019) explained that depression or The feeling of hopelessness experienced by stroke patients could be reduced by doing physical exercise, which is a form of physical rehabilitation in the chronic phase.

From the conclusions of this study, the majority of the characteristics of the duration of suffering from the disease were less than one year because 14 people experienced a stroke with the type of infarction for the first time with a percentage of 70.0%.

The majority of respondents had comorbidities, namely hypertension. In line with Hartono's (2019) research results, it is stated that in Indonesia, there are many patients suffering from hypertension, and half of all strokes are associated with patients who have a history of hypertension (Ministry of Health of the Republic of Indonesia, 2019). Meanwhile, according to (WHO, 2019), hypertension can also cause the risk of heart attack, stroke, and kidney failure, which is in line with research by Laili and Purnamasari (2019), which states that hypertension is a major contributor to blood vessel diseases such as stroke and myocardial infarction as well as chronic kidney disease and failure and congestive heart failure. This is proven by research by Agus Triono (2020), that hypertension that occurs over a long period and continuously can trigger strokes, heart attacks, or heart failure and is also the main cause of chronic kidney failure (Agus Triono, 2020).

Hypertension is a risk factor that generally causes stroke. Hypertension will cause high pressure in the walls of the arteries, which will cause leakage in the brain arteries and even rupture of the brain arteries, which will result in hemorrhagic strokes. Hypertension can also occur, resulting in ischemic stroke due to atherosclerosis (Silva et al., 2015). Laily (2019) explains that the higher the blood pressure, the greater the risk of having a stroke, and someone who has hypertension has a 3-4 times risk of having a stroke compared to people who do not have hypertension. Based on this, the presence of comorbid hypertension in stroke patients will cause a high risk of recurrent stroke, so it is necessary to control blood pressure in stroke patients so that their blood pressure does not rise—stroke frequency where people who have suffered a stroke will have a higher incidence of stroke. Around 1 in 100 adults will experience at least one transient ischemic attack (TIA). Their whole life. If not treated properly, about one-tenth of these patients will have a stroke (generally ischemic stroke) within three months of the first attack, and about one-third will have a stroke within five years of the first attack.

The research results showed that the average muscle strength before the intervention was given was relatively high, namely muscle strength. Many risk factors for stroke affect increasing muscle strength; many people do not do movement exercises because if you don't exercise on muscle strength, muscle strength will decrease. If you do movement frequently exercises, little by little, muscle strength will increase, and was initial score of 1 becomes two. There also, the initial score of 2 becomes four because movement exercises are often done, plus warm water immersion is very effective if both are done; warm water immersion widens blood vessels if you experience joints that are less than optimal in carrying out movements, warm water scientifically it has a physiological effect on the body, it affects the blood vessels, which allows blood circulation to run more smoothly and stabilizes blood flow and heart function. In addition, the loading factor in water increases muscle and ligament strength, which impacts the body's joints. Warm water can relax muscles and have an analgesic effect. A tired body will become refreshed and reduce excessive fatigue. This can reduce symptoms of tingling or Restless Legs Syndrome (RLS) in the elderly (Nurtanti & Ningrum, 2018).

According to Ferry & Nurani (2022), ROM training is said to prevent a decrease in joint flexibility and joint stiffness. Neuromuscular stimulation can increase neuromuscular and muscular chemical activity. This stimulation will stimulate the nerve fibers of the limb muscles, especially the parasympathetic nerves, which stimulate the production of acetylcholine, which causes contractions.

Range of Motion is a joint movement exercise that allows muscle contraction and movement by moving the joints actively or passively according to normal movement. The goal of ROM training is to maintain or improve the ability to move joints normally and completely. This will help increase muscle mass and tone (Umi et al., 2018). Meanwhile, according to (Adriani and Sary, 2019), ROM training aims to increase or maintain muscle flexibility and strength. Limb disorders and paralysis are nursing problems found in stroke sufferers. Independent nursing action to increase limb muscle strength is through active and passive ROM exercises. Regular ROM exercises for stroke sufferers

can increase muscle strength, restore the patient's physical condition, and prevent complications such as pressure ulcers.

Stroke sufferers usually have many risk factors. Therefore, strokes often recur. So, these risk factors must be treated, such as high blood pressure, diabetes, coronary heart disease, high blood LDL cholesterol levels, high blood uric acid levels, obesity, smoking, drinking alcohol, and stress. Hypertension is a major risk factor, both in ischemic stroke and hemorrhagic stroke. The higher the blood pressure, the higher the possibility of stroke, both bleeding and ischemic. Hypertension can result in the rupture of cerebral blood vessels, causing bleeding, and this is fatal because there will be an interruption in blood flow to the distal part, extravasal blood will accumulate, causing increased intracranial pressure, while narrowing of the cerebral blood vessels will disrupt blood flow to the brain and Brain cells will die. Conditions that can occur in stroke patients vary, such as paralysis of the limbs, asymmetrical lips, slurred speech or aphasia (unable to speak), headaches, decreased consciousness, taste disturbances, paralysis, and even up to death. Loss of bodily function due to stroke results in hindered stroke patient productivity and affects the functional status of stroke patients

Conclusions

Most of the respondents were female, predominantly aged 61-65 years, with a duration of suffering from stroke <1 year, with a frequency of 1 attack, and comorbidities dominated by hypertension. The average value of muscle strength before being given Warm Water Soak Hydrotherapy and Passive ROM Exercise for Stroke patients is 2.45. The average value of muscle strength after being given Warm Water Soak Hydrotherapy and Passive ROM Exercise for Stroke Patients is 3.75. There is a difference in the average muscle strength value before and after being given the Warm Water Soak Hydrotherapy intervention and Passive ROM Exercise for Stroke Patients, namely 1.3, with a p-value of 0.00.

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